Driver Remote Monitoring

Status: Available

Group Members:

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Project Description

Trucks, excavators and other drive machinery are major investments in mining industries, and they go through different types of human base error damages that each could be a major obstacle to the profitability of the companies/industries that utilize such machinery as they cause unexpected equipment downtime and losses. Among these damages, perhaps operator drowsiness is the most unpredictable one. Current drowsiness monitoring technologies utilize driver behaviour and car-based measurements via sensors and cameras that are not accurate and reliable. Meanwhile, they detect drowsiness when the driver starts to sleep, which is often too late to prevent an accident, so they are not considered early drowsiness prognosis tools. Hence, there is a need to detect and monitor operator drowsiness in real-time and remotely.

The first and most noticeable physiological alterations occur in the brain during drowsiness, and brain signals (EEG) strongly correlate with drowsiness. EEG signals are considered a reliable and precise drowsiness indicator. Two frequency components of the Electroencephalography signal (Delta and Theta components) increase significantly during drowsiness. The main objective of the project is to design and implement an integrated processing and communication system for available commercial EEG data-capturing systems that feature:

* Delivering the collected data from available data-capturing devices to a central and remote center (iCloud).
* A Bluetooth communication channel.
* An app that is updated in real-time with the captured data
* An HMI (Human Machine Interface) that is updated in real-time with the captured data
* A database system for reporting and analyzing captured data (based on available algorithms) using Microsoft Power BI.

Main Deliverables:
A fully functional prototype with a good set of test cases. The level of testing and functionality should be sufficient to allow beta testing with a group of volunteer subjects.

• Monitoring of drowsiness, including alerts via wireless sensors
• Communication of the captured EEG to iCloud via an iPad.

• Processing the transferred EEG signal in iCloud with the available drowsiness algorithm and alerting the subject via the internet in the vehicle.

• Final report including documentation sufficient to allow our company to evolve the design and refine the device.